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Antimicrobials Potential Activity from Selective Plant Parts of *Fagonia cretica* and *Desmostachya bipinnata*

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ABSTRACT

The aim of the present study is to determine antimicrobial potential activity of *Fagonia cretica* and *Desmostachya bipinnata* plant parts to look into possible natural therapy agents. ***Fagonia cretica* (Linn.)** is most valuable therapeutic medicinal plant, commonly known as Dhamasa and belong to Zygophyllaceae family and ***Desmostachya bipinnata*** *is also* valuable medicinal plant, commonly known as Kusha or Dabh and belong to Poaceae family. *Fagonia cretica* and *Desmostachya bipinnata* have a good medicinal property and used as: urinary disorder, abdominal pain, chronic fever, cancer, dysentery and menorrhagia, and as a diuretic and a blood purifier. Selective plant parts were also used as medicine contents in pharmaceuticals. Antibacterial and antifungal activity has to be done from various selective medicinal plant parts. Potential activity as antimicrobials against bacteria and fungi *Bacillus subtilis* is maximum in methanol extract and minimum against *Staphylococcus aureus* in chloroform extract. *Fagonia cretica* most valuable medicinal plant, used as anti breast cancer drug.

Keywords: *Fagonia cretica; Desmostachya bipinnata; Antimicrobials Activity; Methanol extract; Chloroform extract; Fungi strains; Bacterial strains*.

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INTRODUCTION:

Medicinal plants are the Nature's gift to human beings to help them pursue a disease-free healthy life. In folk medicine, it has been used to cure and treat many diseases. Scientists have been proved that this plant has some activities as a diuretic, ant diarrheal (Medha *et al.,* 2010), analgesic, antipyretic and has an anti-inflammatory effect (Panda *et al.,* 2009). It was also suggested to have hepatoprotective ability (Rahate *et al.,* 2015), help against dysentery, menorrhagia, jaundice, (Joshi, 2003) and has antioxidant effect (Golla & Bhimathati, 2014) as well as anti-ulcerogenic properties (Awaad *et al.,* 2008).

Fagonia cretica have an excellent anti-bacterial activity and can be used for disease therapy. About 43% of the total death happened due to infective diseases in the developed countries in recent years. The search for new effective antimicrobial agents is necessary. In epidemic areas, resistance against antimicrobial agents has emerged due to recurrent infections (Carballo, LJ., *et al.,* 2002). The aims of the present study are antimicrobial potential activity of *Fagonia cretica* plant parts (stem and roots) to look into possible natural therapy agents.

The present world is tending to go back to the uses of natural products for cure and treatment of various infection and diseases to human being. Studies have suggested many natural plants extract with anti-H. pylori activity, including chamomile flowers, coneflower herbs, peppermint leaves, thyme herbs and grapes as well as "Halfa grass" (Malm *et al.,* 2015; Brown *et al.,* 2009; James, 2011).

Desmostachya bipinnata or "Halfa grass" and belongs to Poaceae family, halfa grass is also included in the Gramineae family. Gramineae family comprises more than 660 genera and 10,000 species. It is well known for its great economic and medicinal importance because it includes all cereals, bamboos and sugar cane. There are many medicinal activities of Gramineae species such as astringent and in treatment of wound, anti-emetic, diuretic (Shrestha, *et al.,* 2011), and in treatment of eye problems (Bolus, 2000).

Taxonomical Description:

Taxonomical description of selective experimental plants: ***Fagonia cretica*** and ***Desmostachya bipinnata*** shown in following **Table**

Plant Taxonomy	***Fagonia cretica***	***Desmostachya bipinnata***
Kingdom	Plantae	Plantae
Order	Zygophyllales	Poales
Family	Zygophyllaceae	Poaceae
Genus	*Fagonia*	*Desmostachya*
Species	*cretica*	*bipinnata*

Figure 1: Fagonia cretica plant

Figure 2: Desmostachya bipinnata plant picture

MATERIAL AND METHODS:

Plant Material

Experimental plant *Fagonia cretica* materials were collected from Nagur district and *Desmostachya bipinnata* plant material were collected from Sikar district of Rajasthan in the month of July to August 2015. Experimental plants sample were deposited for authentication in the herbarium Department of Botany, University of Rajasthan. Collected samples were washed with distilled water and shade dried and made all samples in powdered form for further investigations.

Methods:

Sample Extraction and Fractionation:

Take 10g sample each part of *Fagonia cretica* and *Desmostachya bipinnata*, were soaked in 100ml methanol and 100ml chloroform for 24 hrs incubate at 37 ^{0}C and filtered all extractions and dry filtrates in separate glass beaker or Petridish. After drying the samples the dry weight is measured. The difference between the dry weight and blank weight was calculated, according to which 100mg sample was mixed with 1ml DMSO (3 to 5%),the concentration came to be equal to 100mg/ml (Khan AM., *et al.,* 2011).

Antimicrobials activity:

For antibacterial and antifungal activity, fungal and bacterial strains were taken from the Microbiology laboratory of Department of Microbiology, SMS medical collage Jaipur, Rajasthan. These bacterial strains were transported in the nutrient broth and fungal strains in the potato dextrose broth. These bacterial strains were sub-culture in the nutrient agar (NA) and fungi subculture in potato dextrose agar (PDA).

Preparation of inoculums:

A loopful bacterial culture was immersed in the sterile normal saline and fungi culture was immersed in the autoclave sterile distilled water to form the dilution of inoculums (Rumana Saeed, *et al.,* (2015).

Antibacterial activity:

The nutrient agar plates were prepared and left for solidification. These bacterial strains (*Staphylococcus aureus, Escherichia coli, Bacillus subtilis* and *Streptomyces*) were inoculated on the nutrient agar plate by using the sterilized culture swabs. Then wells were formed by using sterile cork borer. The wells were filled with the plant extracts (60 µl in each well). For positive control ciprofloxacin (60 µl) was added to the center of the nutrient agar plate. The Petri plates were incubated for 24 h at 37 °C. After incubation the petri plates were checked for different zone of inhibition formed by the plant extracts (Rahman and Rashid, 2008).

Antifungal activity:

The potato dextrose agar plates were prepared and left for solidification. These fungal strains (*Fusarium oxysporum, Candida albicans, Trichoderma reesei* and *Penicillium chrysogenum*) were inoculated on the potato dextrose agar plate by using the sterilized culture swabs. Then wells were formed by using sterile cork borer. The wells were filled with the plant extracts (60 µl in each well). For positive control Ketoconazole (60 µl) was added to the center of the potato dextrose agar plate. The Petri plates were incubated for 24 h at 37 °C. After incubation the petri plates were checked for different zone of inhibition formed by the plant extracts (Rahman and Rashid, (2008) & National Committee for Clinical Laboratory Standards, (2002).

RESULT AND DISCUSSION:

Antimicrobial activity refers to the process of killing or inhibiting the disease causing microbes. Various antimicrobial agents are used for this purpose. Antimicrobial may be anti-bacterial and anti-fungal activity.

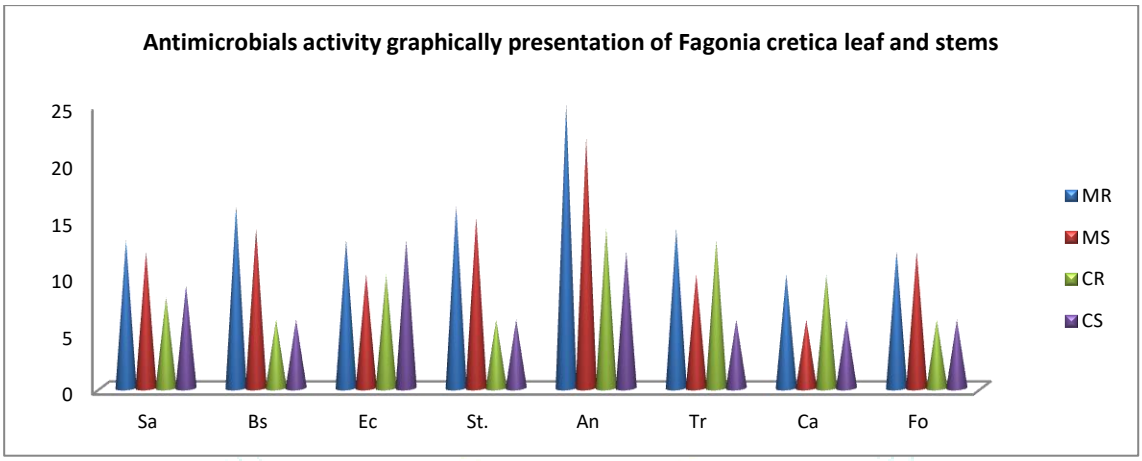
Antimicrobials activity: -

Antibacterial and antifungal activity of *Fagonia cretica* and *Desmostachya bipinnata* extracts chloroform and methanol of root, leaf and stems extract.

Figure 3: - Antimicrobial activity of Methanolic and chloroform extracts of *Fagonia cretica* leaf and stems

S. No.	Fungus and bacteria strains	Methanolic extracts		Chloroform extracts	
		Root (mm)	Stem (mm)	Root (mm)	Stem (mm)
1	Staphylococcus aureus	ZI-13	ZI-12	ZI-08	ZI-09
2	Bacillus subtilis	ZI-16	ZI-14	NA	NA
3	Escherichia coli	ZI-13	ZI-10	ZI-10	ZI-13
4	Streptomyces	ZI-16	ZI-15	NA	NA
5	Aspergillus niger	ZI - 25	ZI - 22	ZI - 14	ZI - 12
6	Trichoderma ressie	ZI-14	ZI-10	ZI- 13	NA
7	Candida albicans	ZI-10	NA	ZI-10	NA
8	Fusarium oxysporium	ZI-12	ZI-12	NA	NA

Note: - ZI = Zone inhibition; NA = No activity.

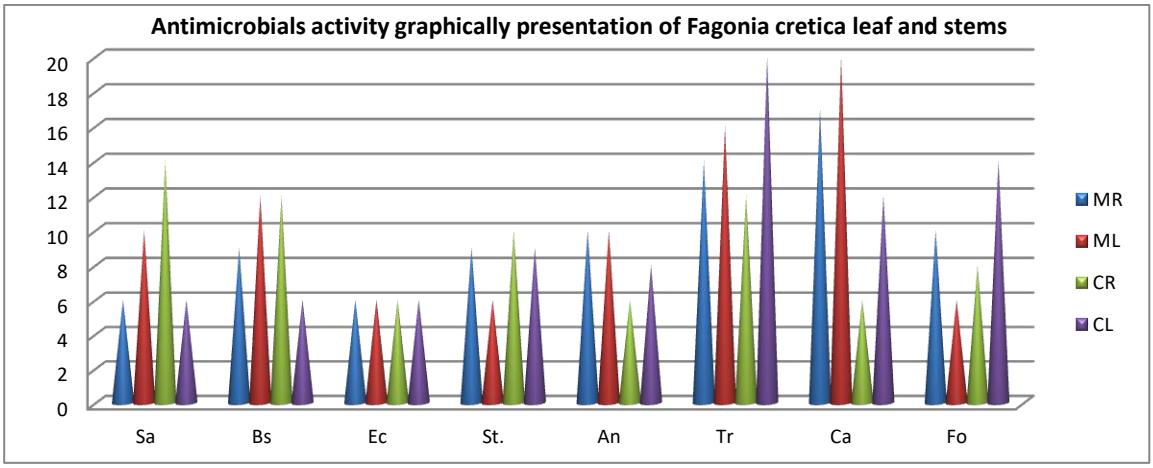


Note: - Sa – Staphylococcus; **Bs –** Bacillus subtilis; **Ec -** Escherichia coli; **St. –**Streptomyces; **An –** Aspergillus niger; **Tr –** Trichoderma ressie; **Ca - Candida albicans; Fo -** Fusarium oxysporium**; MR –** Methanol root; **MS –** Methanol stem; **CR –** Chloroform root; **CS –** Chloroform stem.

Figure 4: - Antimicrobial activity of Methanolic and chloroform extracts of *Desmostachya bipinnata* leaf and stems

S. No.	Fungus and bacteria strains	Methanolic extracts		Chloroform extracts	
		Root (mm)	Leaf (mm)	Root (mm)	Leaf (mm)
1	Staphylococcus aureus	NA	ZI- 10	ZI- 14	NA
2	Bacillus Subtilis	ZI-09	ZI-12	ZI-12	NA
3	Escherichia coli	NA	NA	NA	NA
4	Streptomyces	ZI- 09	NA	ZI - 10	ZI- 09
5	Aspergillus niger	ZI - 10	ZI - 10	NA	ZI - 08
6	Trichoderma Ressie	ZI-14	ZI-16	ZI-12	ZI-20
7	Candida albicans	ZI-17	ZI - 20	NA	ZI-12
8	Fusarium oxysporium	ZI-10	NA	ZI-08	ZI-14

Note: - ZI = Zone inhibition; NA = No activity.



Note: - Sa – Staphylococcus; **Bs –** Bacillus subtilis; **Ec -** Escherichia coli; **St. –**Streptomyces; **An –** Aspergillus niger; **Tr –** Trichoderma ressie; **Ca - Candida albicans; Fo -** Fusarium oxysporium**; MR –** Methanol root; **ML –** Methanol leaf; **CR –** Chloroform root; **CL –** Chloroform leaf.

DISCUSSION

Finally present study of Antimicrobial activity were found good activity against Antibacterial and Antifungal, prepared both plant extracts with organic compound were used to Chloroform ($CHCl_3$) and Methanol (CH_3OH) with different plant parts (root, stem and leaf).

All extract of organic compounds were found sensitivity against Bacteria and Fungi. Bacteria such as: Escherichia coli; Bacillus subtilis; Staphylococcus aureus and Streptomyces. Fungi are Aspergillus niger; Fusarium oxysporum; Candida albicans and Trichoderma ressie.

CONCLUSION

In the present study, Antibacterial activity and antifungal activities of root and stems Methanolic and Chloroform extract of *Fagonia* cretica. Root and leaf Methanolic and Chloroform extracts of *Desmostachya bipinnata* was investigated. The extracts were found to antibacterial and antifungal activity in all extracts, Based on the results it can be concluded that, the root and stems Methanolic and Chloroform extract of *Fagonia cretica* which contains high amount of antibiotics property. Root and leaf are Methanolic and Chloroform extract of *Desmostachya bipinnata* high amount of antibiotics contents, finally this study is proved that both selective plant parts are very useful and potential activity against antimicrobial. In future this plant extract are significant sources of natural antibiotics, which may be helpful in prevent and cure of various disease and infections.

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